

Volume 48 July–December 1983



EUROPHYSICS JOURNAL

Philosophical Magazine

First Published in 1798

Physics of Condensed Matter

- A Defects and Mechanical Properties
- B Electronic Optical and Magnetic Properties



Taylor & Francis Ltd

London and New York

PHILOSOPHICAL MAGAZINE

Editor:

Professor E. A. DAVIS

Associate Editors:

Professor A. J. FORTY

Dr. P. M. HAZZLEDINE

Dr. M. J. GORINGE

Dr. S. R. ELLIOTT

E. P. S. Editorial Committee:

Professor J. FRIEDEL (Paris)

Professor A. SEEGER (Stuttgart)

Professor U. VALDRÈ (Bologna)

Consultant Editor:

Professor Sir NEVILL MOTT

Book Review Editor:

Dr. E. MARSEGLIA

Subscription Information

ISSN 0141-8610

USA, Canada and Mexico (air freight): annual subscription (payable in advance), \$560.00; per part \$50.00 (surface post paid). Air freight and mailing in the USA by Publications Expediting Inc., 200 Meacham Avenue, Elmont, New York 11003. Second class postage paid at Jamaica, New York 11431. USA Postmaster: Send address changes to *Philosophical Magazine*, Publications Expediting Inc., 200 Meacham Avenue, Elmont, New York 11003. US subscribers should send order and cheque (in favour of Taylor & Francis Ltd) to Account 04 810 879 Bankers Trust Company, P.O. Box 9137, Church Street Station, New York, N.Y. 10049.

Japan (accelerated surface post): apply to exclusive agents, Kinokuniya Company Ltd, Odakyu West-Shinjuku Building, 47-1 Hatsudai 1-chome, Shibuya-ku, Tokyo 151. Telex 2322535.

FR Germany (surface post): annual subscription (payable in advance), DM 920.00; per part DM 82.00. Subscribers in FR Germany should send order and cheque (in favour of Taylor & Francis Ltd) to Account No. 073/6686, Deutsche Bank AG, BLZ 500 700 10, Postfach 2623, Rossmarkt 18, 6000 Frankfurt/Main 1.

UK and the rest of the world (surface post; accelerated surface post to Australasia; air freight to India): annual subscription (payable in advance), £197.00; per part £18.00 (surface post paid).

Published monthly by Taylor & Francis Ltd, 4 John Street, London WC1N 2ET, UK. Telex 858540.

Printed by Taylor & Francis (Printers) Ltd, Rankine Road, Basingstoke, Hampshire RG24 0PR, UK.

CONTENTS OF VOL. 48 Nos 1-6

NUMBER 1—JULY

PART A

	PAGE
Random walks and correlation factor in diffusion in a three-dimensional lattice with coordination number 8 By M. KOIWA and S. ISHIOKA.....	1
A positron annihilation study of vacancy recovery in quenched single crystals of Al-1.2 × 10⁻² at.% In By G. M. HOOD and R. J. SCHULTZ	11
On surface melting of gallium By G. FRITSCH and E. LÜSCHER.....	21
The classification of close-packed clusters of substitutional point defects in crystals By S. A. AHMAD, A. G. CROCKER and B. A. S. FARIDI.....	31
The nature of point defects in plastically deformed aluminium By K. SASSA, W. PETRY and G. VOGL.....	41
An investigation of the stress exponent and subgrain size in Al after stress reduction By M. S. SOLIMAN, T. J. GINTER and F. A. MOHAMED.....	63
Barrier energy for the b.c.c.-f.c.c. martensitic transition in sodium By T. SUZUKI and H. M. LEDBETTER.....	83
The effect of dislocation loops on the lattice parameter, determined by X-ray diffraction By J. R. WILLIS, R. BULLOUGH and A. M. STONEHAM.....	95
Measurement of lattice displacement of {100} platelets in diamond By J. C. BARRY, L. A. BURSILL and J. L. HUTCHISON.....	109
The climb of dissociated dislocations in a quenched Cu-13.43 at.% Al alloy By B. DÉCAMPS, D. CHERNS and M. CONDAT.....	123
Dark-field electron microscopy of dissociated dislocations and surface steps in silicon using forbidden reflections By A. OURMAZD, G. R. ANSTIS and P. B. HIRSCH	139
Computer simulation of <011> tilt grain boundaries in nickel oxide By D. M. DUFFY and P. W. TASKER.....	155
A (110) CS structure in reduced rutile crystals By T. MIYANO, M. IWANISHI, T. HARADA, C. KAITO and M. SHIOJIRI..	163

PART B

	PAGE
Flux pinning in interdiffusing thin films By W. E. YETTER and E. J. KRAMER.....	1
Molecular dynamics studies of molten NaI. III. Longitudinal and transverse currents By M. DIXON.....	13
Noise spectroscopy in amorphous silicon films By J. C. ANDERSON.....	31
Theory of doping in chalcogenide glasses By P. NAGY.....	47
Deformation-induced point defects in germanium By F. H. BAUMANN and W. SCHRÖTER.....	55
Electronic structure of some binary uranium and thorium oxides and halides By G. C. ALLEN, P. M. TUCKER and J. W. TYLER.....	63
Microwave absorption in amorphous chalcogenide semiconductors By K. SHIMAKAWA	77
Monte Carlo simulations of geminate-pair dissociation in discrete anisotropic lattices By B. RIES, G. SCHÖNHERR, H. BÄSSLER and M. SILVER	87
Book reviews	107
Letters Section:	
Variable-range-hopping conduction in a strong magnetic field By R. MANSFIELD and H. TOKUMOTO	L1

NUMBER 2—AUGUST

PART A

A proposed diamond polishing process By C. JEYNES	169
Diffusion in concentrated lattice gases. IV. Diffusion coefficient of tracer particle with different jump rate By R. KUTNER and K. W. KEHR.....	199
Nucleation and growth process of dislocation loops in electron-irradiated β-Nb-3.1 wt% Zr alloy By K. NAKAI, C. KINOSHITA, Y. MUROO and S. KITAJIMA	215
Multilayer stacking faults in b.c.c. metals By V. PAIDAR	231

	PAGE
Weak-beam electron microscopy of radiation-induced segregation By H. SAKA	239
On the width of charged {110} ferroelectric domain walls in potassium niobate By PENG JU LIN and L. A. BURSILL	251
Cross-slip of twinning dislocations on crossing domain boundaries in ordered Ni₃V By G. VANDERSCHAEVE and B. ESCAIG	265
The isolated partial and dissociated total dislocations in deformed ZnS crystals By A. V. ZARETSKII, Y. A. OSIPYAN, V. F. PETRENKO, G. K. STRUKOVA and I. I. KHODOS	279
Structure and non-stoichiometry of calcium aluminates By H. SCHMID and L. C. DE JONGHE	287
Inverse primary creep By B. BURTON	299
Letters Section:	
Disordering and enhanced damping in Cu₃Au By K. MIURA and T. YOKOYAMA	L1
PART B	
A theory of the admittance of an amorphous silicon Schottky barrier By I. W. ARCHIBALD and R. A. ABRAM	111
Theory of magnetic after-effects in ferromagnetic amorphous alloys By H. KRONMÜLLER	127
Molecular dynamics simulation of the structure of soda silica By S. K. MITRA and R. W. HOCKNEY	151
Determination of the <i>g</i> values of the ODMR signals in a-Si:H By B. C. CAVENETT, S. P. DEPINNA, I. G. AUSTIN and T. M. SEARLE	169
Determination of localized state distributions from anomalously-dispersive transport data By H. MICHIEL, J. M. MARSHALL and G. J. ADRIAENSSENS	187
Investigation of the refractive indices of LaF₃, CeF₃, PrF₃ and NdF₃ By R. LAIHO and M. LAKKISTO	203
Book reviews	209
Erratum	213

NUMBER 3—SEPTEMBER

PART A

	PAGE
Crystalline defects in M_7C_3 carbides	
By J. P. MORNIROLI, E. BAUER-GROSSE and M. GANTOIS	311
Work hardening and the stability of deformation in AlZnMg alloys	
By I. KOVÁCS, J. LENDVAI, T. UNGÁR and Z. RAJKOVITS.....	329
Solute-enhanced self-diffusion. On the validity of the Howard-Manning theory	
By S. ISHIOKA, M. KOIWA and H. NAKAJIMA.....	341
Microstructural changes in vanadium pentoxide in controlled environments	
By P. L. GAL.....	359
Characterization of the oxide-metal interface at the surface of a stainless steel	
By G. C. ALLEN, R. K. WILD and M. WEISS.....	373
Phenomenological coefficients for atom transport in dilute interstitial solid solutions	
By Y. OKAMURA and A. R. ALLNATT.....	387
A quantitative study of vacancy defects in quenched tungsten by combined field-ion microscopy and electrical resistometry	
By J. Y. PARK, H.-C. W. HUANG, R. W. SIEGEL and R. W. BALLUFFI	397
Tweed microstructures. I. Characterization in β-NiAl	
By I. M. ROBERTSON and C. M. WAYMAN	421
Tweed microstructures. II. In several phases of the Ni-Al system	
By I. M. ROBERTSON and C. M. WAYMAN	443
Weak-beam study of glide dislocations in h.c.p. cobalt	
By A. KORNER and H. P. KARNTHALER	469
Letters Section:	
Mobilities of quenched-in defects in NiAl	
By TIAN-MIN WANG, M. SHIMOTOMAI and M. DOYAMA.....	L5
The characteristic equation for superplastic flow	
By B. BURTON.....	L9
The plastic compression of copper cones	
By M. M. CHAUDHRI.....	L15

PART B

Dielectric relaxation and modulus of V_2O_5-TeO_2 glasses	
By A. MANSINGH, V. K. DHAWAN and M. SAYER	215
The electrical resistivity of GP zones. Temperature dependence	
By A. J. HILLEL	237

	PAGE
Computer simulation of a two-dimensional soap froth. I. Method and motivation	
By D. WEAIRE and J. P. KERMODE	245
Ferromagnetic domain wall pinning by a random array of inhomogeneities	
By P. GAUNT	261
Time-resolved measurements of photoluminescence in As-S alloy glasses and films evaporated from a-As₂S₃	
By K. MURAYAMA, G. S. HIGASHI and M. A. KASTNER.....	277
Thermally stimulated current transport peak in a system with spatially disordered hopping sites	
By J. PLANS, F. J. BALTÁ CALLEJA, M. ZIELINSKI and M. KRYSZEWSKI	289
Resonant phonon scattering in metallic glasses	
By N. THOMAS	297
Book reviews	307

NUMBER 4—OCTOBER

PART A

Detection of several ω-phase morphologies in β-III Ti by small-angle neutron scattering and transmission electron microscopy	
By M. FATEMI, C. S. PANDE and H. R. CHILD	479
Effect of atomic order on a martensitic transformation	
By A. PLANES, J. VIÑALS and V. TORRA	501
Reversible movement of the austenite-martensite interface and dislocation structures in reverse-transformed austenite in Fe-Ni-C alloys	
By S. KAJIWARA and T. KIKUCHI.....	509
The structure of interphase boundaries in an Al-Al₃Ni directionally solidified eutectic alloy. I. Experimental observations	
By K. M. KNOWLES and P. J. GOODHEW	527
The structure of interphase boundaries in an Al-Al₃Ni directionally solidified eutectic alloy. II. Geometrical modelling	
By K. M. KNOWLES and P. J. GOODHEW	555
Third-order elastic constants and acoustic mode vibrational anharmonicity of bismuth	
By TU HAILING and G. A. SAUNDERS	571
Hardness measurement at penetration depths as small as 20 nm	
By J. B. PETHICA, R. HUTCHINGS and W. C. OLIVER	593

	PAGE
A grain boundary in cellular structures near the onset of convection By P. MANNEVILLE and Y. POMEAU.....	607
Interactions of interstitials with twin boundaries in face-centred-cubic metals By J. I. AKHTER and A. G. CROCKER.....	623
Tweed microstructures. III. Origin of the tweed contrast in β and γ Ni-Al alloys By I. M. ROBERTSON and C. M. WAYMAN.....	629
The thermodynamics of mixed oxide reactor fuels By C. R. A. CATLOW and P. W. TASKER.....	649
Diffusion of gallium along small-angle grain boundaries in germanium By K. AHLBORN and W. SCHRÖTER.....	661
Letters Section:	
Low-energy limit to channelling effects in the inelastic scattering of fast electrons By P. G. SELF and P. R. BUSECK.....	L21
Microscopic stress-strain relationships in models of amorphous metals By R. HARRIS and L. J. LEWIS.....	L27
PART B	
Explanation of the laser-induced oscillatory phenomenon in amorphous semiconductor films By J. HAJTÓ, J. JÁNOSSY and A. FIRTH.....	311
On the stability and structure of Cu-Zr based glasses By Y. CALVAYRAC, J. P. CHEVALIER, M. HARMELIN, A. QUIVY and J. BIGOT.....	323
Electronic transport in glow-discharge microcrystalline germanium By A. D. STEWART, D. I. JONES and G. WILLEKE.....	333
Properties and structure of amorphous hydrogenated carbon films By D. R. MCKENZIE, R. C. MCPHEDRAN, N. SAVVIDES and L. C. BOTTEN.....	341
Solitons and the electrical and mobility properties of dislocations in silicon By M. HEGGIE and R. JONES.....	365
Calculation of the localized electronic states associated with static and moving dislocations in silicon By M. HEGGIE and R. JONES.....	379
The recursion method. Application to ideal and reconstructed vacancies in diamond and silicon By R. JONES and T. KING.....	391
Book reviews	397

	PAGE
Letters Section:	
Surface composition and morphology of magnetite crystals during dissolution By G. C. ALLEN, R. M. SELLERS and P. M. TUCKER.....	L5
On the convexity of anelastic and viscoelastic relaxation functions By M. KRISHNAMOORTHY and V. BALAKRISHNAN.....	L11
A Raman study of photochemical reactions in amorphous As₂S₃ on polycrystalline Ag₂S substrates By P. J. S. EWEN, W. TAYLOR, A. P. FIRTH and A. E. OWEN.....	L15
The electronic structure of liquid metals By J. L. BEEBY.....	L23
The liquid alloy system Mn_xTe_{1-x} By D. LAUNDY, J. E. ENDERBY, M. GAY and A. BARNES.....	L29
Photocurrent reversal and time-of-flight in amorphous silicon-hydrogen films By R. KÖNENKAMP, A. M. HERMANN and A. MADAN.....	L33
Coherent bremsstrahlung peaks in X-ray microanalysis spectra By J. C. H. SPENCE, G. REESE, N. YAMAMOTO and G. KURIZKI.....	L39

NUMBER 5—NOVEMBER

PART A

An electron-yield EXAFS study of anodic-oxide and hydrated-oxide films on pure aluminium By S. M. EL-MASHRI, R. G. JONES and A. J. FORTY.....	665
A new theory of the homogeneous nucleation of a coherent precipitate By T. KAMUO and H. FUKUTOMI.....	685
On the fracture of brittle-matrix/ductile-particle composites By V. D. KRSTIC.....	695
Dislocations in a roll hydrodynamic instability in nematics: static limit By E. GUAZZELLI, E. GUYON and J. E. WESFREID.....	709
Dislocation motion in layered structures By E. DUBOIS-VIOLETTE, E. GUAZZELLI and J. PROST.....	727
Effects of magnetic and structural changes on elastic moduli of iron-manganese alloys By J. T. LENKKERI and J. LEVOSKA.....	749
Ratio of cell diameter to dislocation spacing for creep of Zircaloy-4 By F. POVOLO, A. J. MARZOCCA and J. C. CAPITANI.....	759
Indentation and liquid impact studies on coated germanium By S. VAN DER ZWAAG and J. E. FIELD.....	767
Radiation damage in pure and helium-doped α-Al₂O₃ in the HVEM. Quantitative aspects of void and aluminium precipitate formation By G. P. PELLs and T. SHIKAMA.....	779

	PAGE
Diffusional relaxation of the dislocation-inclusion repulsion By D. J. SROLOVITZ, R. A. PETKOVIC-LUTON and M. J. LUTON.....	795
Slip bands in metallic glasses By P. G. ZIELINSKI and D. G. AST	811
Spinodal decomposition and isothermal ω-phase formation in a Ti-Nb alloy, investigated by small-angle X-ray scattering By O. LYON, C. SEVERAC and C. SERVANT.....	825
Letters Section:	
Dislocation structures in fatigued copper single crystals orientated for double-slip By N. Y. JIN.....	L33
Some problems with the grain-boundary-dislocation climb mechanism for diffusion-induced grain boundary migration, and possible solutions By A. H. KING.....	L39

PART B

A model of trap-controlled recombination in disordered materials By V. I. ARKHIPOV, J. A. POPOVA and A. I. RUDENKO	401
Study of optical and elastic properties of rutile-structure MF_2 crystals By R. K. SINGH and S. TIWARY	411
On the phase transition(s) of magnetite at low temperatures By M. O. RIGO, J. F. MARECHE and V. A. M. BRABERS	421
ESR and electrical properties of P-doped microcrystalline Si By S. HASEGAWA, S. NARIKAWA and Y. KURATA	431
The density of conduction electrons at a cylindrical dilatation in a metal By A. CLAESSON and S. MARKLUND	449
Magnetic quantum oscillations in quasi-two-dimensional systems By P. M. CHAIKIN, T. HOLSTEIN and M. YA AZBEL.....	457
Negative magnetoresistance in glassy carbon By D. F. BAKER and R. H. BRAGG	475
Book reviews.....	489
Letters Section:	
Zero-frequency modes in vibrational calculations for clusters By D. WEAIRE.....	L45
Carrier lifetimes in amorphous silicon junctions from delayed and interrupted field experiments By W. E. SPEAR, H. L. STEEMERS and H. MANNSPERGER	L49

NUMBER 6—DECEMBER

PART A

PAGE

Dislocation microstructures in steel during deep drawing By J. V. FERNANDES and J.-H. SCHMITT	841
On the loading behaviour, structure and equilibrium states of hexagonal crystals By F. MILSTEIN, Y. C. TANG, K. HUANG and R. HSU	871
Vacancies and vacancy complexes in binary alloys By G. BÉRCES and I. KOVÁCS	883
The long-range distortion caused by point defects By M. J. GILLAN	903
Dislocation motion in a crystal having a high Peierls barrier By Y. KAWATA and S. ISHIOKA	921
Temperature-dependent neutron scattering from silicon single crystals By R. E. BEDDOE, S. MESSOLORAS, R. J. STEWART, G. KOSTORZ and E. W. J. MITCHELL	935
HREM study of {100} ferroelectric domain walls in potassium niobate By L. A. BURSILL, PENG JU LIN and FENG DUAN	953
Helium bubble nucleation at grain boundaries By P. L. LANE and P. J. GOODHEW	965
A theory of mechanical relaxation of substitutional–interstitial (tetrahedral) atom complexes in the b.c.c. lattice By M. KOIWA, S. ISHIOKA, G. CANNELLI and R. CANTELLI	987
Theoretical study of high-resolution electron microscopy images of monoclinic rare earth oxides, i.e. dynamic objects with a thickness up to 250 Å By G. NIHOUL	999
Letters Section:	
A supercooled water layer on ice By G. J. TURNER	L45
A supercooled water layer on ice—Reply By N. H. FLETCHER	L51
Comments on “Diffusion of ^{60}Co in $\text{Zr}_{50}\text{Ti}_{50}$: A new anomaly?” By C. HERZIG and U. KÖHLER	L53
Comment on “A model for the effect of grain size on the yield stress of metals” By K. J. KURZYDŁOWSKI and R. A. VARIN	L55
Reply to comments on “A model for the effect of grain size on the yield stress of metals” By M. A. MEYERS	L59
Subject index	1015
Index of authors (with titles)	1020
Book review index	1029

PART B

	PAGE
Absolute ionic partial molal hydration volumes in water at 298 K By H. D. B. JENKINS and M. S. F. PRITCHETT	493
Hole transport in solid solutions of substituted triarylmethanes in bisphenol-A-polycarbonate By D. M. PAI, J. F. YANUS, M. STOLKA, D. RENFER and W. W. LIMBURG	505
Electronic structure and positron annihilation in B2-ordered CuZn By J. SVOBODA and M. ŠOB	523
Electronic behaviour of liquid $\text{Se}_{0.5}\text{Te}_{0.5}$ doped with monovalent elements By R. FISCHER, M. CUTLER and H. RASOLONDAMANITRA	537
The Hall mobility of carriers hopping in an impurity band. III. Numerical results and analysis for energy-dependent and energy-independent models By P. N. BUTCHER, J. A. MCINNES and S. SUMMERFIELD	551
Hydrogenation and direct-substitutional doping of evaporated amorphous silicon films By S. ISELBORN, H. RÜBEL, J. GEIGER and B. SCHRÖDER	561
Influence of substrate bias on the optical properties of amorphous hydrogenated silicon films prepared by sputtering By J. TARDY and R. MEAUDRE	571
Book reviews	587
Letters Section:	
The effect of hydrogen on a.c. and d.c. conduction in sputtered amorphous germanium films. A temperature shift By A. R. LONG, W. R. HOGG, and N. BALKAN	L55
Subject index	591
Index of authors (with titles)	596
Book review index	605